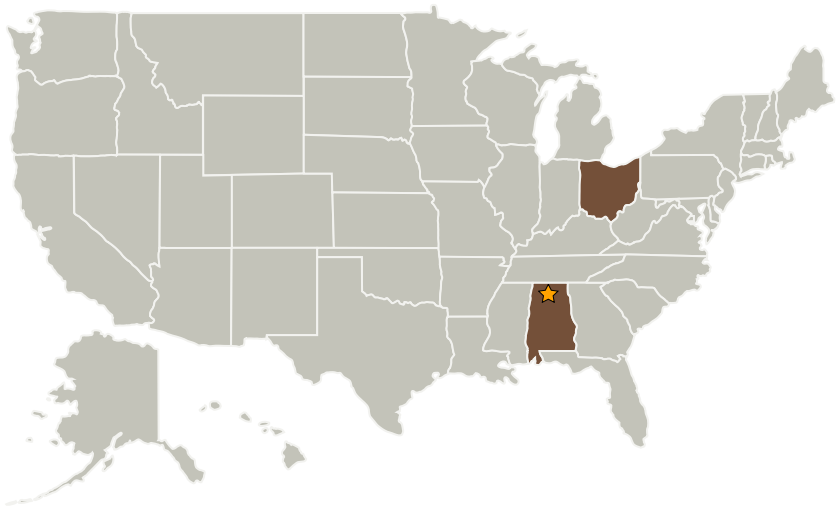
# Ceramic Oxygen Generator for Carbon Dioxide Electrolysis Systems, Phase I

Completed Technology Project (2006 - 2006)

## Project Introduction

In this SBIR Phase I proposal (Topic X9.01), NexTech Materials, Ltd. proposes to develop a high efficiency ceramic oxygen generation system which will separate O2 from the CO2-rich (95%) Martian atmosphere through a solid-oxide electrolysis process at 750-850?aC. The CO2 electrolysis process will produce O2 and CO. The O2 may be used for life support and as an oxidant (for a fuel cell power system), and CO may be collected and used directly as fuel (or converted to methane for use as a fuel). The electrolysis system is based on the Tubular Monolithic Ceramic Oxygen Generator (TM-COG) platform, whereby multiple oxygen separation cells are connected in series across both faces of a porous, flat-tube support. The design allows for simplified gas manifolding, sealing, and current collection and permits a high degree of cell stacking efficiency. In Phase I of the project, a prototype TM-COG module will be fabricated and the performance will be evaluated. The Phase I work will establish a foundation for work in Phase II, where a breadboard prototype TM-COG system will be produced and delivered to NASA that will be capable of producing 125 grams per hour of oxygen (or 1 kg per eight-hour day).

## Primary U.S. Work Locations and Key Partners

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Marshall Space Flight Center (MSFC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Marshall Space Flight Center(MSFC) | Lead Organization | NASA Center | Huntsville, Alabama |
| NexTech Materials, Ltd. | Supporting Organization | Industry | Lewis Center, Ohio |

| Primary U.S. Work Locations | |
|---|---|
| Alabama | Ohio |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables